1. A process comprising electrochemical reaction of a monomeric composition comprising thieno[3,4-b]thiophene, to form a polymeric composition comprising units derived from thieno[3,4-b]thiophene.

2. The process of claim 1, wherein electrochemical reaction is in an electrochemical cell comprising an electrolyte, a working electrode, a counter electrode, and a reference electrode in operable communication.

3. The process of claim 2, wherein the working electrode is a platintum, gold, or vitreous carbon working electrode, and the counter electrode is platinum.

4. The process of claim 3, wherein the working electrode is a vitreous carbon electrode and the electrolyte is tetrabutylammonium perchlorate/acetonitrile.

5. The process of claim 1, wherein reaction provides the polymeric composition on an indium tin oxide substrate.

6. The process of claim 1, further comprising reducing the polymeric composition.

8. The process of claim 1, wherein the polymeric composition has a band gap of about 0.85 V.

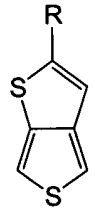
9. The process of claim 8, wherein the polymeric composition is transparent.

10. The process of claim 1, wherein the polymeric composition has no observable color in the oxidized form.

11. The process of claim 1, wherein the monomeric composition further comprises a co-monomer reactive with the thieno[3,4-b]thiophene.

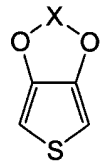
12. The process of claim 11, wherein the co-monomer is a thiophene, substituted thiophene, substituted thieno[3,4-b]thiophene, dithieno[3,4-b:3',4'-d]thiophene, bithiophene, pyrrole, substituted pyrrole, phenylene, substituted phenylene, naphthalene, substituted naphthalene, biphenyl, substituted biphenyl, terphenyl, substituted terphenyl, phenylene vinylene, substituted phenylene vinylene, or a combination comprising at least one of the foregoing co-monomers, wherein the substituents are one or more of -H, hydroxyl, C_6-C_{36} aryl, C_3-C_6 cycloalkyl, C_1-C_{12} alkyl, halogen (i.e., F, Cl, Br, I), C_1-C_{12} alkoxy, C_1-C_{12} alkylthio, C_1-C_{12} perfluoroalkyl, C_6-C_{36} perfluoroaryl, pyridyl, cyano, thiocyanato, nitro, amino, C_1-C_{12} alkylamino, C_1-C_{12} aminoalkyl, acyl, sulfoxyl, sulfonyl, amido, and/or carbamoyl.

13. The process of claim 12, wherein the co-monomer is



wherein R is C_1-C_{12} primary, secondary or tertiary alkyl, cylcoalkyl, C_6-C_{36} aryl, or a functional group.

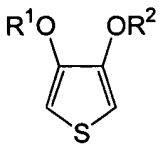
14. The process of claim 12, wherein the co-monomer is



wherein X is C_1-C_4 alkylene or substituted C_1-C_4 alkylene.

15. The process of claim 14, wherein X is C_1-C_{12} alkyl- or C_6-C_{12} phenyl-substituted ethylene, or a 1,2-cyclohexylene.

16. The process of claim 12, wherein the co-monomer is



wherein R_1 and R_2 are each independently -H, C_1-C_4 alkyl, phenyl, or substituted phenyl.

17. The process of claim 1, wherein the monomeric composition further comprises a polyanion.

18. The process of claim 17, wherein the polyanion is a polycarboxylate or a polymeric sulfonate.